

Structural Design Check
for
Gabion Basket Retaining Wall
at
La Cantera
Merthyr Tydfil
CF48 1RG

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LA CANTERA, HEOL GERRIG, MERTHYR

CF48
IRG

PROJECT **GABION BASKET WALL**

PREPARED BY **CM**

DATE **MAR 22**

JOB No. **GAB/01**

DRG No.

PAGE No. **1 OF 5**

CHECKED BY

DATE

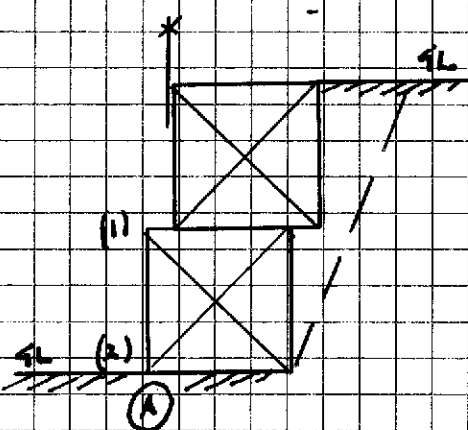
REF

CALCULATIONS

DESIGN

Check stability of gabion wall to rear garden

DESIGN CRITERIA



WALL SECTION (max)

Backfill (granular) = 16 kN/m³

$\phi = 38^\circ$ (granular fill)

$K_a = 0.24$

Stone fill density = 20 kN/m³

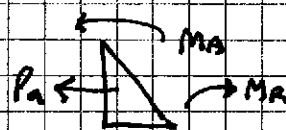
Bearing capacity = 100 kN/m²
(from clay)

LEVEL ①

$h = 1.0 \text{ m}$

Basket density (80%) = $0.8 \times 20 = \underline{16 \text{ kN/m}^3}$

Take moments about toe A



$$M_R = \frac{1}{2} \times (1 \times 1 \times 16) = \underline{8.00 \text{ kNm/m}} \rightarrow$$

$$W_A = (1 \times 1 \times 16) = \underline{16.00 \text{ kN/m}} \downarrow$$

$$P_A = \frac{K_a \gamma h^2}{2} = \frac{0.24 \times 16 \times 1^2}{2} = \underline{1.92 \text{ kN/m}} \leftarrow$$

$$M_{A \text{ sand}} = 1.92 \times \frac{1}{3} = \underline{0.64} \curvearrowright$$

$$FOS_{OT} = \frac{8.0}{0.64} = \underline{12.5} > 2 \text{ --- o.k.}$$

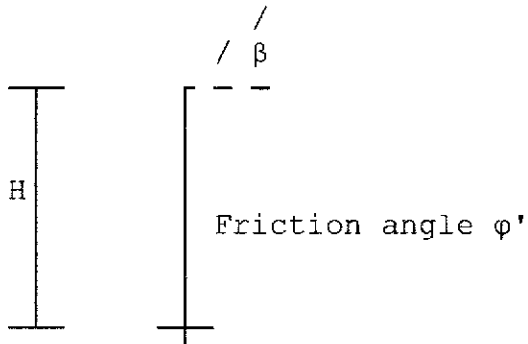
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REF	CALCULATIONS
	<u>$h = 2.0 \text{ m}$</u> $M_R = 0.6(1 \times 1 \times 16) + 0.3(1 \times 1 \times 16) = \underline{17.6 \text{ kNm/m}} \downarrow$ $W_A = (2 \times 1 \times 16) = \underline{32.0 \text{ kNm}} \downarrow$ $P_A = \frac{0.24 \times 16 \times 2^2}{2} = \underline{7.68 \text{ kNm}} \leftarrow$ $M_A = 7.68 \times \frac{2}{3} = \underline{5.12 \text{ kNm/m}} \nwarrow$ $FOS_{os} = 17.6 / 5.12 = \underline{3.44} > 2 \text{ --- o.k}$ <u>Sliding</u> $F_R = \frac{2}{3} \tan 38^\circ \times 32 = 16.67 \text{ kNm} \downarrow$ $FOS_{sliding} = 16.67 / 7.68 = \underline{2.17} > 2 \text{ --- o.k}$ <u>Bearing pressure</u> $P_{max/min} = \frac{R_v}{b} \pm \frac{M}{Z}$ $Z = \frac{d^2}{6} = \frac{1^2}{6} = 0.17$ $b = 1.0 \text{ m}$ $P_{max} = \frac{32}{1} + \frac{5.12}{0.17} = \underline{62.1 \text{ kN/m}^2}$ $P_{min} = \frac{32}{1} - \frac{5.12}{0.17} = \underline{1.88 \text{ kN/m}^2}$ } o.k < 100

*** GABION WALL STABLE IN O/TURNING. SLIDING + BEARING**

Location: Level (1)

Active/passive wall pressures (Rankine) retaining soil slope



Design assumption:

- water table below wall
- Cohesion $c'=0$

Height of wall
Unit weight of soil
Soil slope in degrees
Soil friction angle in degrees

$H=1.00$ m
 $\gamma=16$ kN/m³
 $\beta=0^\circ$
 $\phi=38^\circ$
 $\beta'=\text{RAD}(\beta)=0$ radians

Cohesive strength of soil

$c'=0$ kN/m²

Let

$\phi'=\text{RAD}(\phi)=0.66323$ radians
 $k=\text{SQR}((\text{COS}(\beta'))^2-(\text{COS}(\phi'))^2)$
 $=\text{SQR}((\text{COS}(0))^2-(\text{COS}(0.66323))^2)$
 $=0.61566$

Then

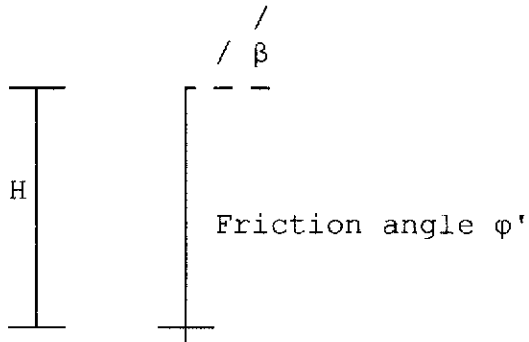
$K_a=(\text{COS}(\beta')-k)/(\text{COS}(\beta')+k)$
 $=(\text{COS}(0)-0.61566)/(\text{COS}(0)+0.61566)$
 $=0.23788$

Total active thrust on wall

$P_a=0.5*K_a*\gamma*H^2*\text{COS}(\beta')$
 $=0.5*0.23788*16*1^2*\text{COS}(0)$
 $=1.9031$ kN/m

Location: Level (2)

Active/passive wall pressures (Rankine) retaining soil slope



Design assumption:

- water table below wall
- Cohesion $c'=0$

Height of wall
 Unit weight of soil
 Soil slope in degrees
 Soil friction angle in degrees

$H=2$ m
 $\gamma=16$ kN/m³
 $\beta=0^\circ$
 $\phi=38^\circ$
 $\beta'=\text{RAD}(\beta)=0$ radians

Cohesive strength of soil

$c'=0$ kN/m²

Let

$\phi'=\text{RAD}(\phi)=0.66323$ radians
 $k=\text{SQR}((\text{COS}(\beta'))^2-(\text{COS}(\phi'))^2)$
 $=\text{SQR}((\text{COS}(0))^2-(\text{COS}(0.66323))^2)$
 $=0.61566$

Then

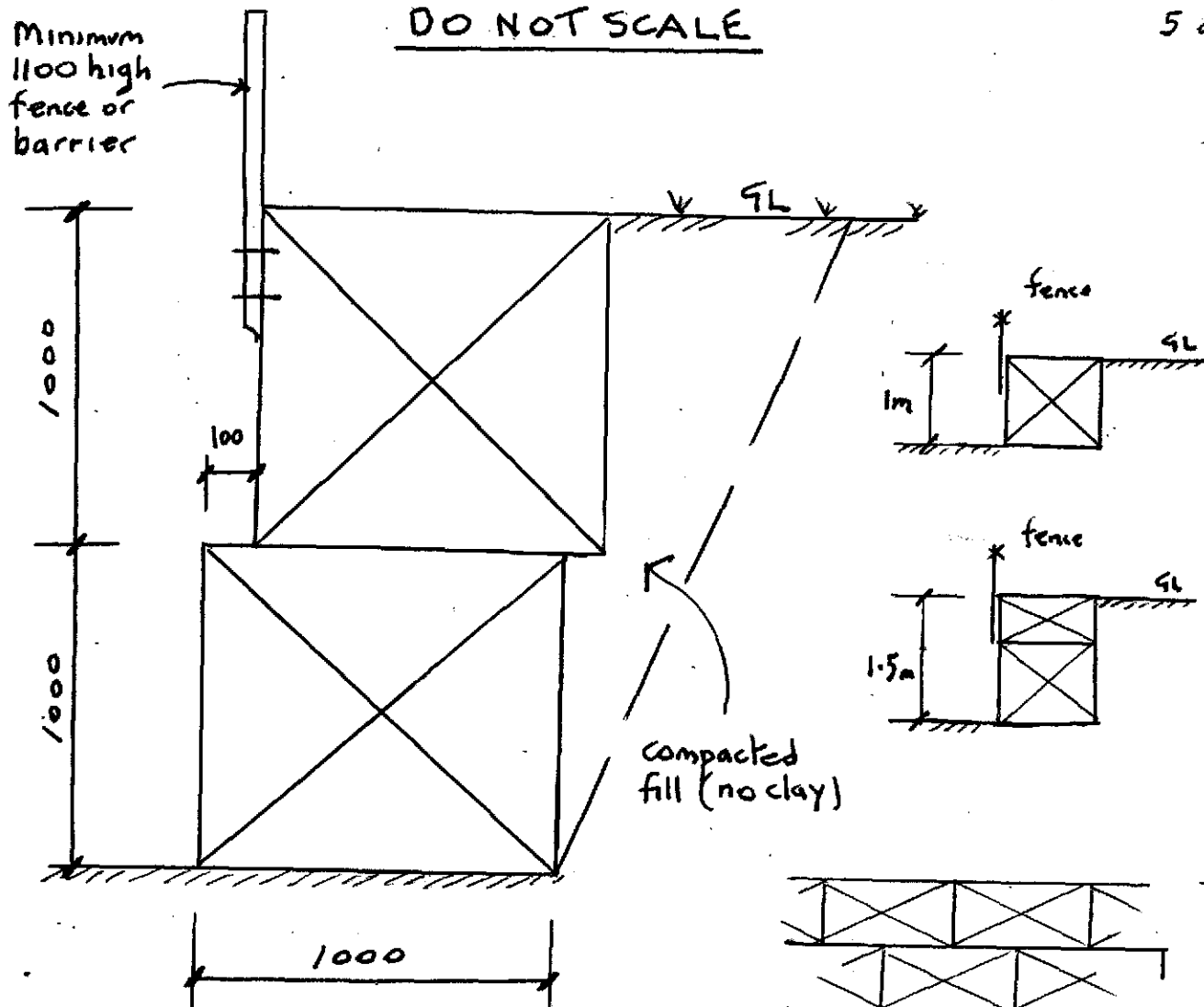
$K_a=(\text{COS}(\beta')-k)/(\text{COS}(\beta')+k)$
 $=(\text{COS}(0)-0.61566)/(\text{COS}(0)+0.61566)$
 $=0.23788$

Total active thrust on wall

$P_a=0.5*K_a*\gamma*H^2*\text{COS}(\beta')$
 $=0.5*0.23788*16*2^2*\text{COS}(0)$
 $=7.6123$ kN/m

DO NOT SCALE

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2.0m WALL SECTION

NOTES

REMOVE AND SOFT SPOTS TO WALL FORMATION AND 'INFILL' + BLIND WITH MINIMUM 75 COMPACTED SUB-BASE TEMPORARY SUPPORT TO EXCAVATION DURING CONSTRUCTION > 1.5m

FRONT OF WALL HAND FILLED WITH SELECTED STONE WITH X-WIRES INTERNALLY TO AVOID BULGING, BASKETS CONSTRUCTED TO MANUFACTURERS SPECIFICATION

FILL BASKETS CAREFULLY WITH CLEAN STONE (NO CLAY)

PLANNING PERMISSION MAY BE REQUIRED

Project Title

GABION BASKET RETAINING
WALL AT LA CANTERA
HEOL GERRIG, CF481RG

Drawn CM

Date MAR 22

Drg.

WALL / 01

Rev.